LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – **APRIL 2023**

UCH 1502 – ANALYTICAL CHEMISTRY

Date: 13-05-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A				
Answer ALL the Questions				
1.	**Define the following**		**(5 x 1 = 5)**	
a)	Accuracy		K1	CO1
b)	ppm		K1	CO1
c)	Von Weimarn ratio		K1	CO1
d)	Retention Factor		K1	CO1
e)	DTG		K1	CO1
2.	**Choose the correct answer**		**(5 x 1 = 5)**	
a)	Which of the following error is caused by poor calibration of the instrument? (i) Random error (ii) Gross error (iii) Instrumental error (iv) Precision error		K1	CO1
b)	The normality of one molar sodium hydroxide solution is (i)1.0 N (ii) 2.0 N (iii) 0.5 N (iv) 0.1 N		K1	CO1
c)	The precipitant used for the estimation of Ni^{2+} is (i) Cupferron (ii) Oxine (iii) DMG (iv) EDTA		K1	CO1
d)	The example of drying agent is (i) Calcium chloride (ii) sodium sulphate (iii) Both i & ii (iv) None of the above		K1	CO1
e)	In DTA, the difference in ---------- between the sample and inert reference material is measured. (i) weight (ii) Temperature (iii) heat evolved (iv) None of the above		K1	CO1
3.	**Match the following**		**(5 x 1 = 5)**	
a)	COSHH --- Heat flow		K2	CO1
b)	Fe^{2+} vs $KMnO_4$ --- Precipitation titration.		K2	CO1
c)	Argentometry --- Self indicator		K2	CO1
d)	Camphor --- Employers		K2	CO1
e)	DTA --- Sublimation		K2	CO1
4.	**State TRUE or FALSE**		**(5 x 1 = 5)**	
a)	The significant figures of (i) 0.5040 (ii) 6.0235×10^{-34} are 4 and 5.		K2	CO1
b)	NaOH is used as a primary standard in volumetric analysis.		K2	CO1
c)	Calcium can be estimated as calcium oxalate in gravimetric analysis.		K2	CO1
d)	Separating funnel can be used to purify miscible solvents.		K2	CO1
e)	In TGA analysis, the temperature is kept constant.		K2	CO1
SECTION B				
Answer any TWO of the following in 100 words			**(2 x 10 = 20)**	
5.	a.	Write a note on Material Safety Data Sheet.	**(5)**	K3 CO2
	b.	Enumerate the general rules in the storage and handling of chemicals.	**(5)**	

6.	a.	Define the term mole fraction. Calculate the normality of NaOH if 40 g is dissolved in 250 mL of water.	**(5)**	K3	CO2
	b.	Suggest an indicator for the following titrations. (i) Cl^- vs Ag^+ (ii) Mg^{2+} vs EDTA (iii) $H_2C_2O_4$ vs NaOH (iv) Fe^{2+} vs $K_2Cr_2O_7$ (v) $H_2C_2O_4$ vs $KMnO_4$	**(5)**		
7.	a.	Arrive at the relation between solubility and solubility product.	**(5)**	K3	CO2
	b.	Write a short note on co-precipitation and post precipitation.	**(5)**		
8	a.	Outline the basic principle and the procedure involved in TLC.	**(5)**	K3	CO2
	b.	Explain the factors affecting the size and shape of a thermogram.	**(5)**		
SECTION C					
Answer any TWO of the following in 100 words			**(2 x 10 = 20)**		
9.	a.	Illustrate the first aid procedures to be followed in the laboratory.	**(5)**	K4	CO3
	b.	Analyse the DTA curves of calcium oxalate monohydrate in CO_2 and air atmosphere.	**(5)**		
10.	a.	Outline the requirements of a primary standard substance. Cite an example of a primary and secondary standard substance.	**(5)**	K4	CO3
	b.	Calculate the pH of (i) 0.25 N HCl (ii) 0.001 N NaOH	**(5)**		
11.	a.	Explain the theory of adsorption indicators.	**(5)**	K4	CO3
	b.	Discuss the factors affecting the solubility of a precipitate in gravimetric analysis.	**(5)**		
12.		Explain the apparatus setup, principle and working procedure for the distillation of two miscible liquids having very close boiling points.	**(10)**	K4	CO3
SECTION D					
Answer any ONE of the following in 250 words			**(1 x 20 = 20)**		
13.	a.	Elaborate the different types of errors with examples.	**(10)**	K5	CO4
	b.	Explain the principle and the titration involved in the estimation of magnesium by complexometric titration.	**(10)**		
14.	a.	The solubility of $PbCl_2$ at 25 ^oC is 4.448 g dm^{-3}. Determine the value of $K_{sp.}$	**(5)**	K5	CO4
	b.	Summarize the principle and working of the ion exchange chromatography with its applications.	**(10)**		
	c.	Interpret the TGA curve of silver nitrate with a neat sketch.	**(5)**		
SECTION E					
Answer any ONE of the following in 250 words			**(1 x 20 = 20)**		
15.	a.	Calculate the mean deviation, median, spread and coefficient of variance of the following five titre values: 20.5, 21.5, 20.3, 19.5, 21.8 mL.	**(10)**	K6	CO5
	b.	Derive Henderson equation of an acidic buffer. Mention its significance.	**(10)**		
16.	a.	Explain the principle and procedure involved in the determination of chloride by Volhard's method	**(10)**	K6	CO5
	b.	Write and explain the various steps involved in the recrystallization process.	**(5)**		
	c.	Describe the instrumentation of TGA analysis with a neat block diagram.	**(5)**		

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